



Armed Forces College of Medicine AFCM



Lymph node & Spleen

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Professor of Histology

INTENDED LEARNING OBJECTIVES (ILO)

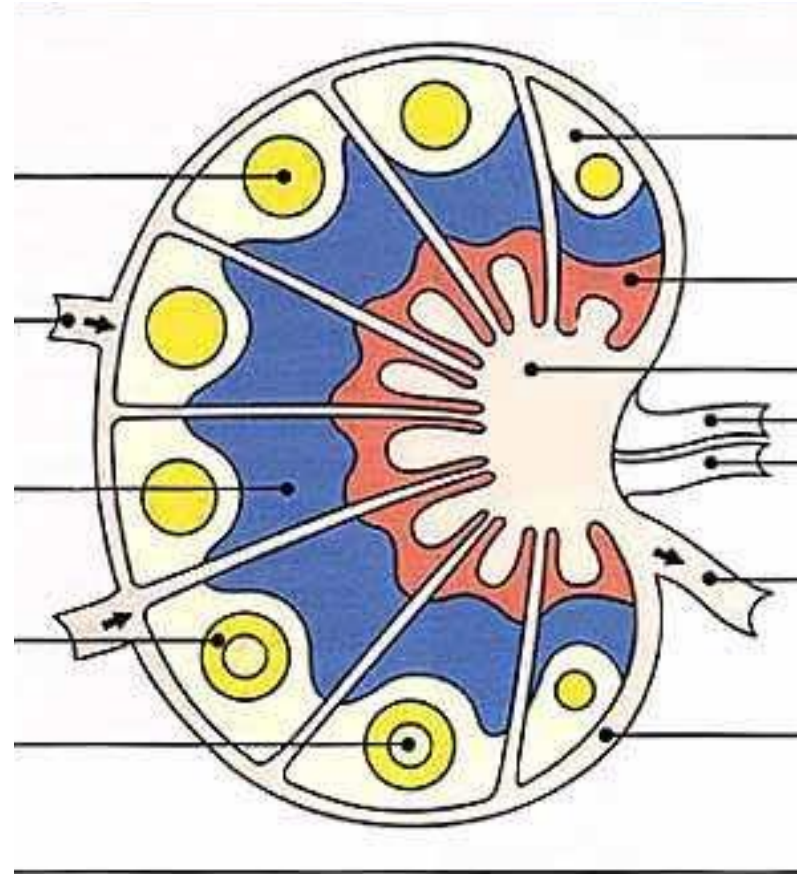


- **By the end of this lecture you should be able to:**
 - 1. Describe the structure of the lymph node**
 - 2. Correlate the structure of the lymph node to function.**
 - 3. Appreciate the structure of the lymph node in certain diseases.**
 - 4. Describe the microscopic structure of spleen (the white pulp).**
 - 5. Identify the thymus-dependent zone of the spleen**

Lymph Node



- **Small, encapsulated & ovoid or bean-shaped**
 - **Convex surface** penetrated by afferent lymphatic vessels.
 - **Concave surface (Hilum):**
 - vessels entering and leaving,
 - lymph leaves via efferent lymphatic vessels
- Valves**

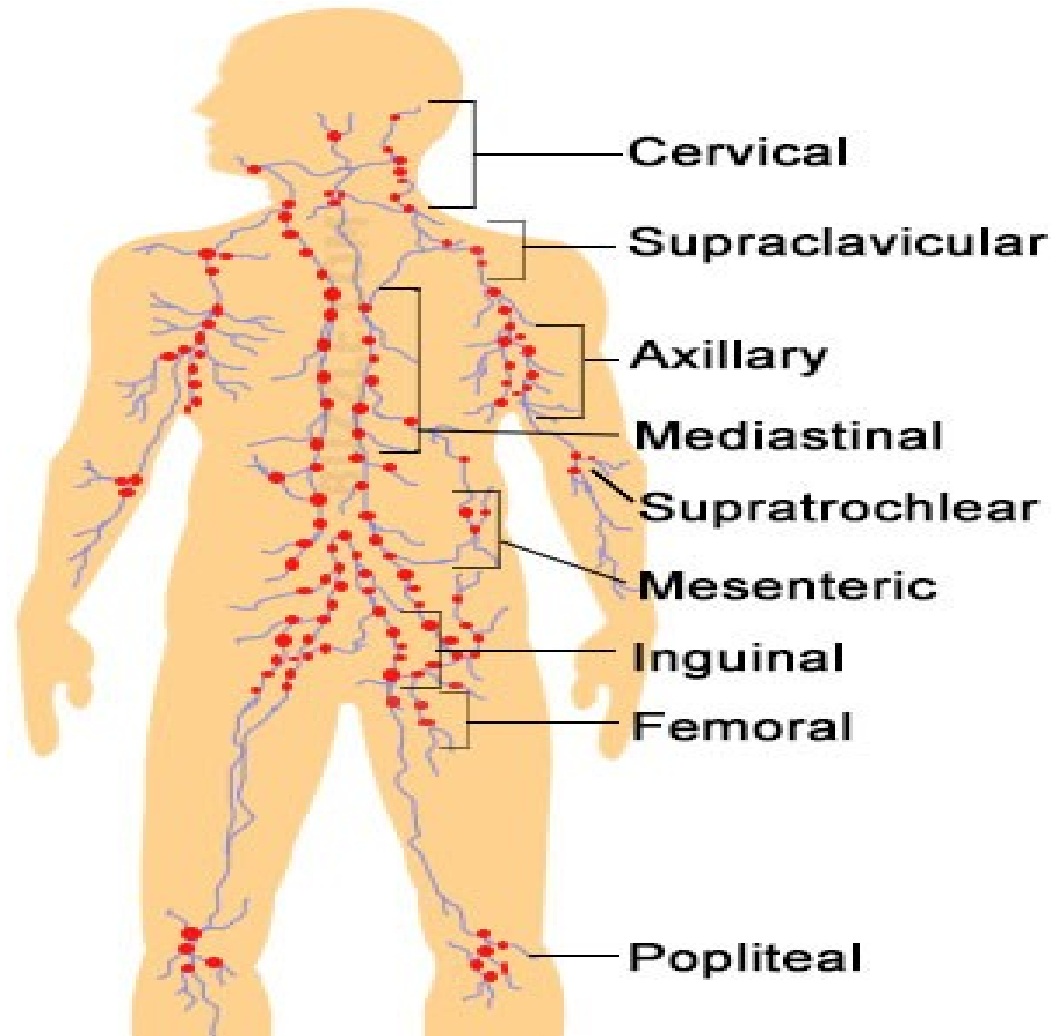


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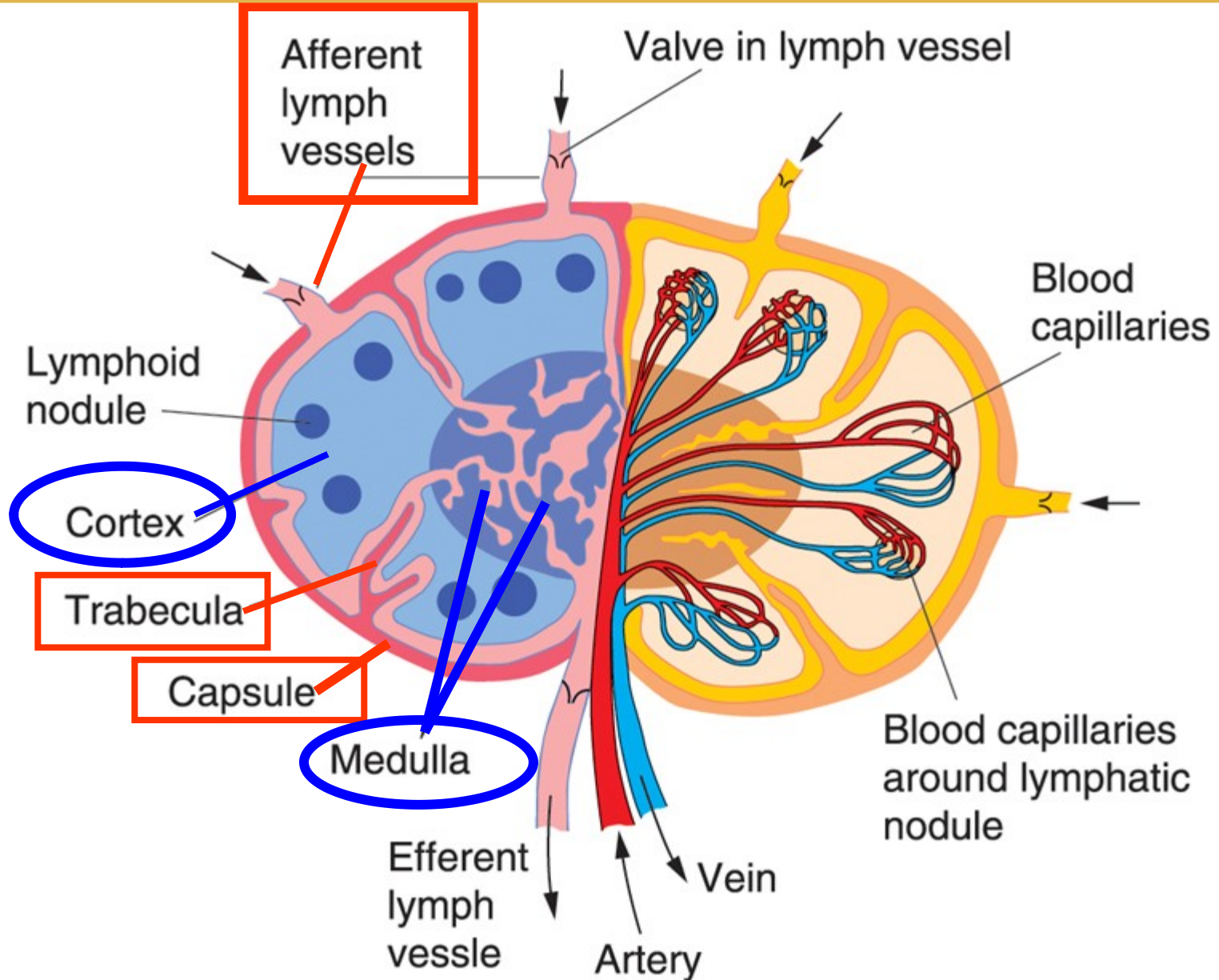
Where are lymph nodes located



**Present along
the course of
lymphatic
vessels to
filter the
lymph**



Lymph Node

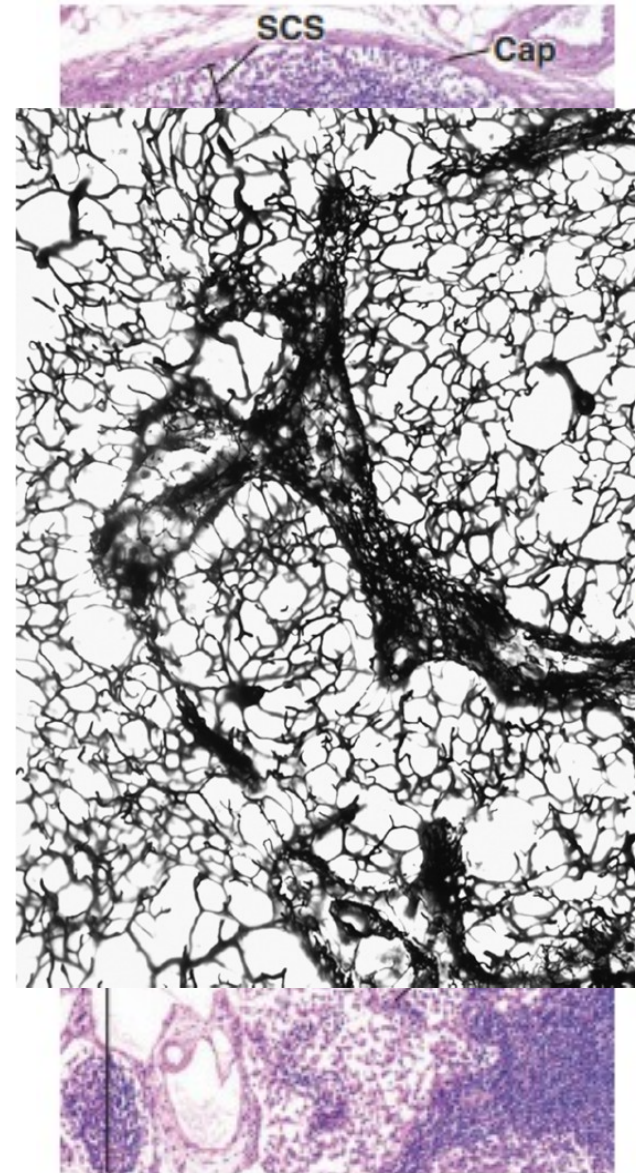


Lymph Node



Stroma:

1. **Capsule:** dense irregular C.T.
2. **Trabeculae:** **septa** arising from the deep surface of the capsule divide the lymph node into **incomplete compartments** while in the medulla they branch and anastomose.
3. **Reticular C.T:** network of reticular cells and fibers. (**silver**)



Lymph Node - **Parenchyma**



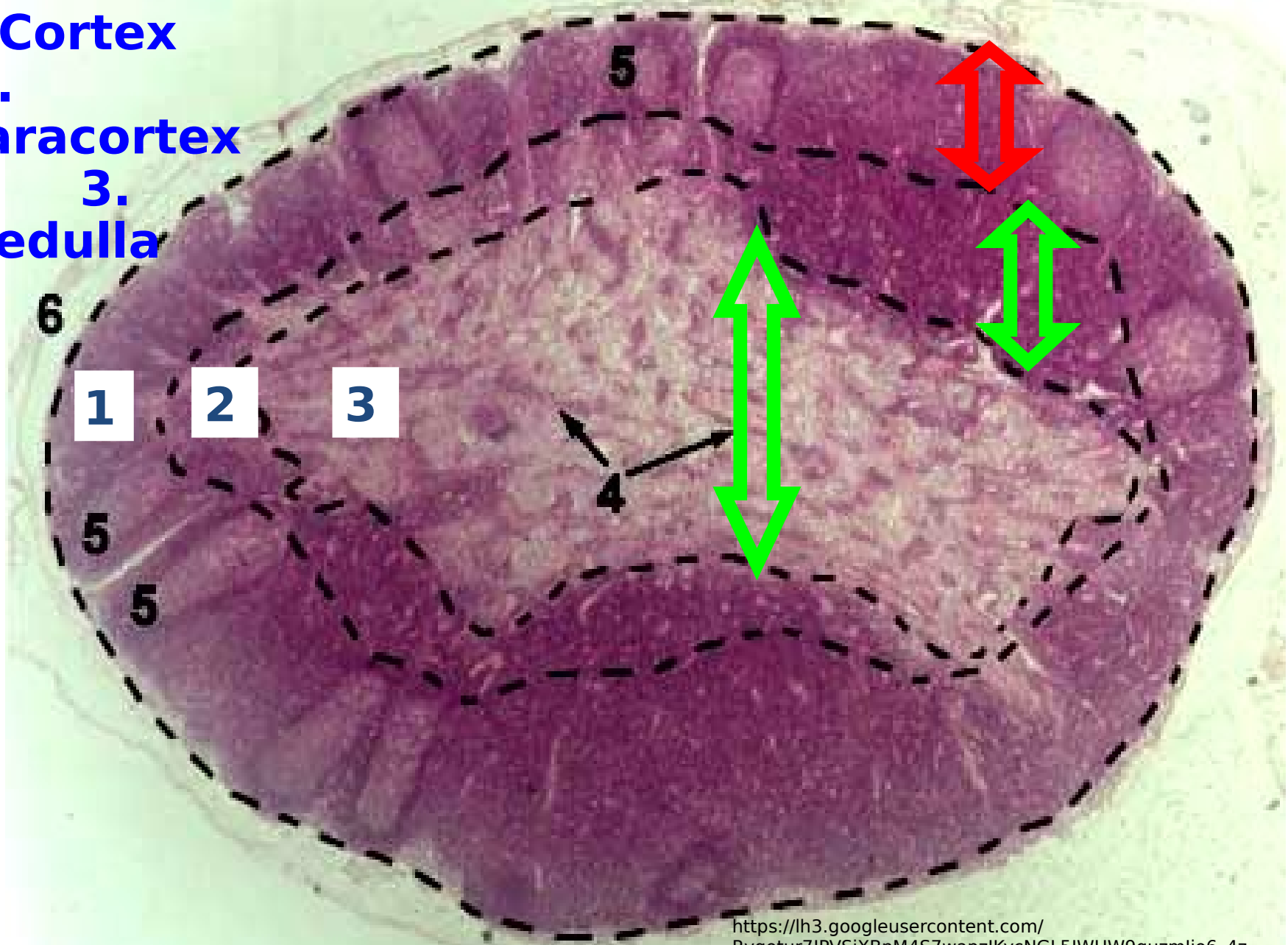
1. Cortex

2.

Paracortex

3.

Medulla



1-Cortex of the Lymph Node



A-Lymphoid Nodules

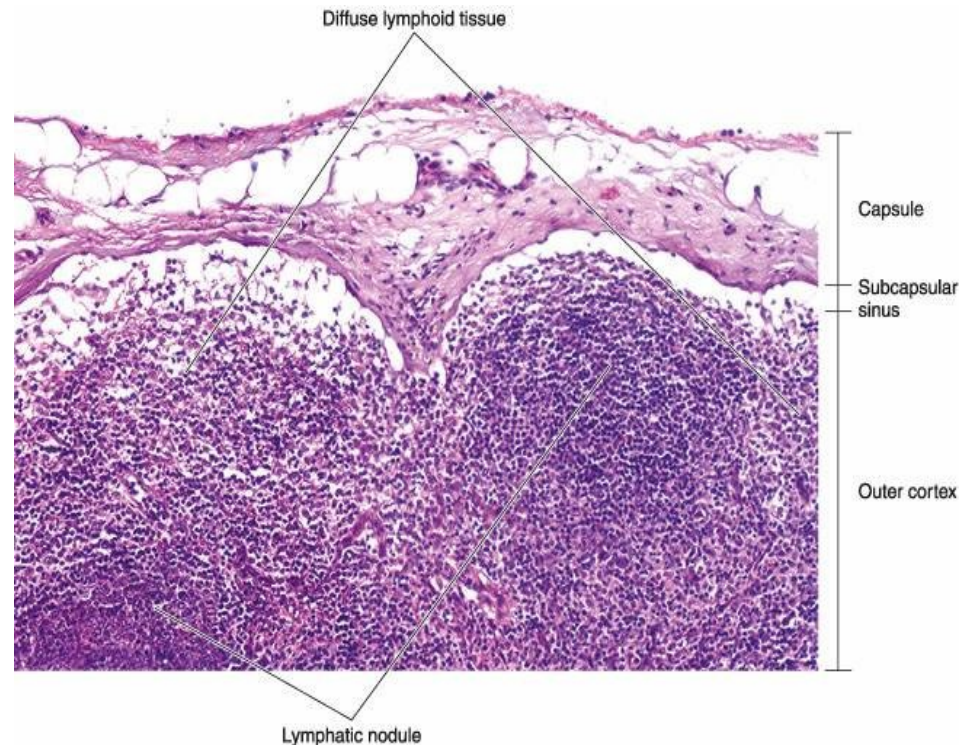
They are aggregation of lymphocytes under the capsule.

Types:

1-Primary:
homogenous

2-Secondary: Dark periphery and pale central region→
(germinal center)

B-Cortical lymphatic sinuses



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Cortex of the Lymph Node



A-Lymphoid Nodules

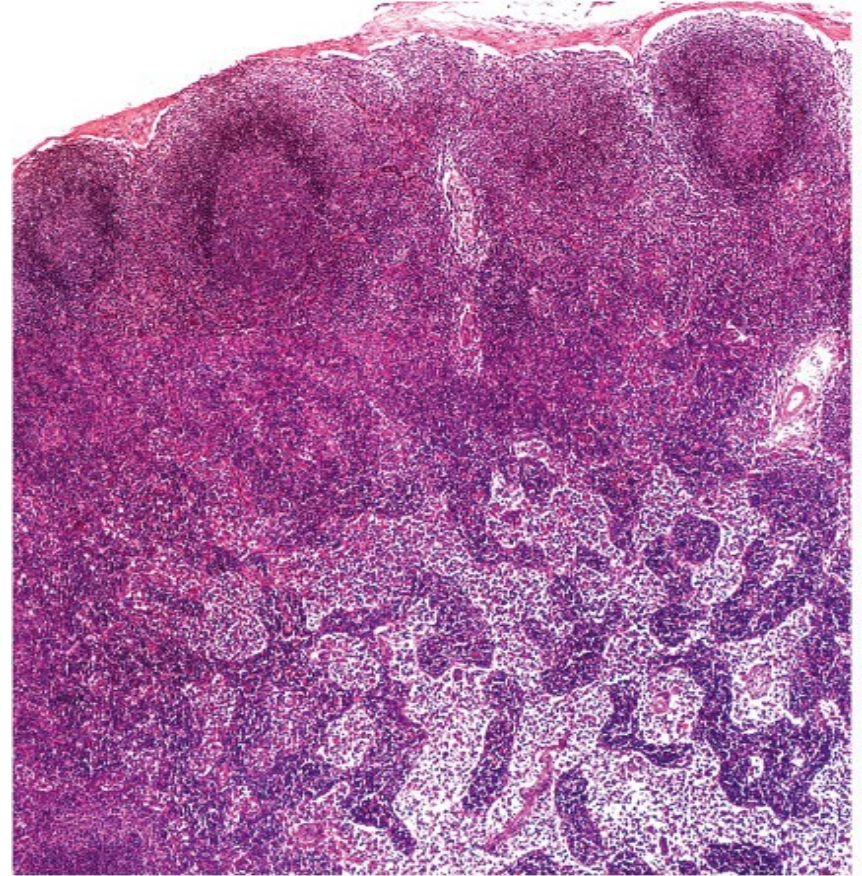
Types:

1-Primary:
homogenous

2-Secondary: Dark periphery and pale central region→

(What are the cells present in the Germinal center?)

**Activated B lymphocytes,
T-helper,
Macrophages,
Plasma cells
Dendritic cells**



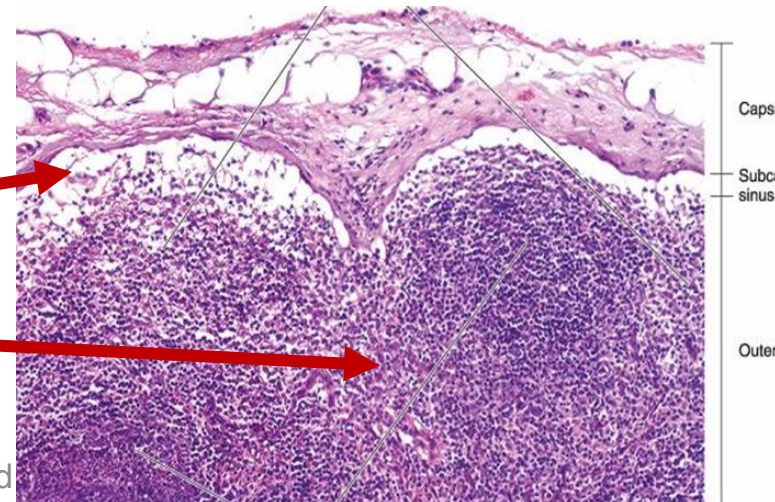
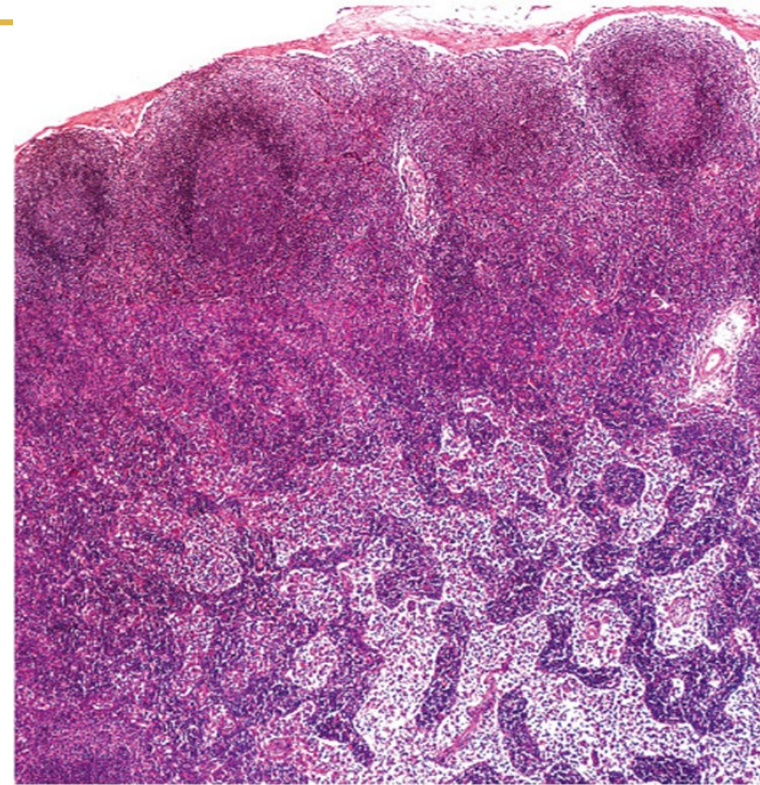
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Cortex of the Lymph node

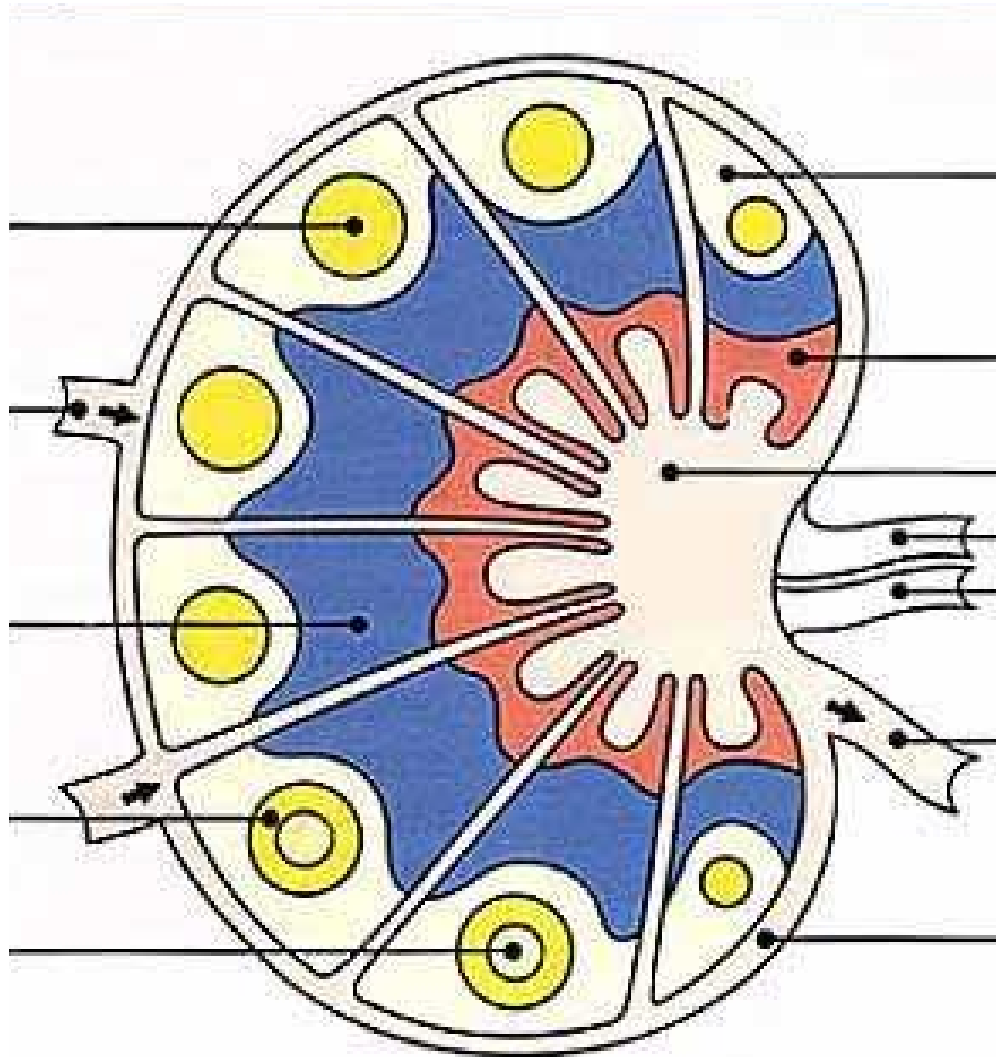


B- Cortical lymphoid sinuses

- They are spaces filled with lymph surrounding the lymphatic nodules and trabeculae.
- They are lined by **endothelial cells** and **partially by reticular cells and macrophage**.
- Subcapsular sinus
- Cortical &



Lymph Pathway in Lymph Node



**Afferent
lymphatic**



**Subcapsular
sinuses**



**Cortical and
trabecular
sinuses**



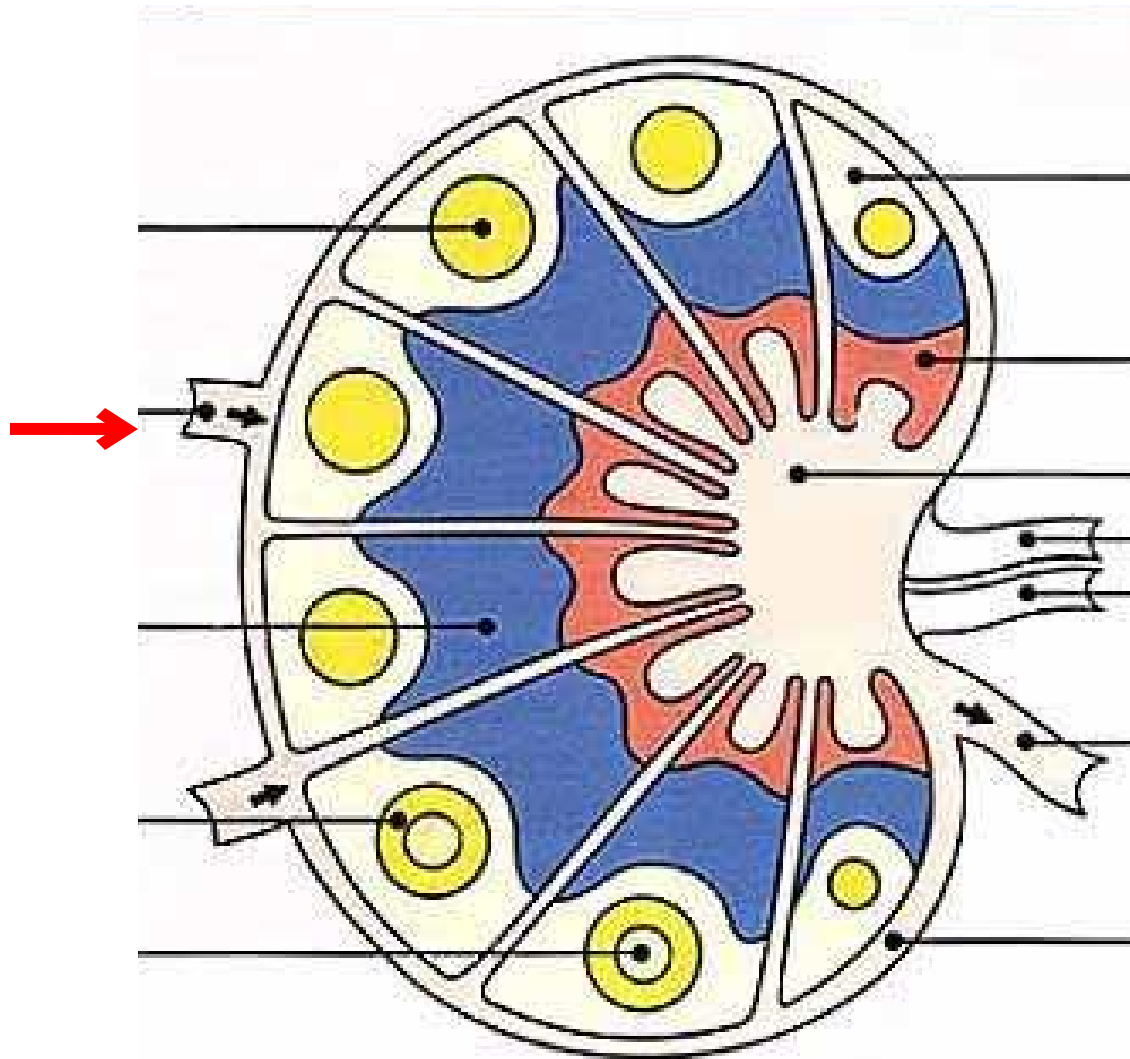
**Medullary
sinuses
(in medulla)**



Efferent

<https://lh3.googleusercontent.com/vIP1tpqSRB1I8BDZBGHruDslLZcibpKBHNzgM4puwCj62hNggttQ0-F4mMvIghIusEfkSA>

Lymph Pathway in Lymph Node



<https://lh3.googleusercontent.com/vIP1tpqSRB1I8BDZBGHruDsILZcibpKBHNzqM4puwCj62hNgttQ0-F4mMvqglqDsUFxs1A=s122>

Paracortex of the Lymph node



❑ It is present between the cortex and medulla.

❑ Characterized by:

**1-Thymus-dependent area
(Numerous T lymphocytes)**

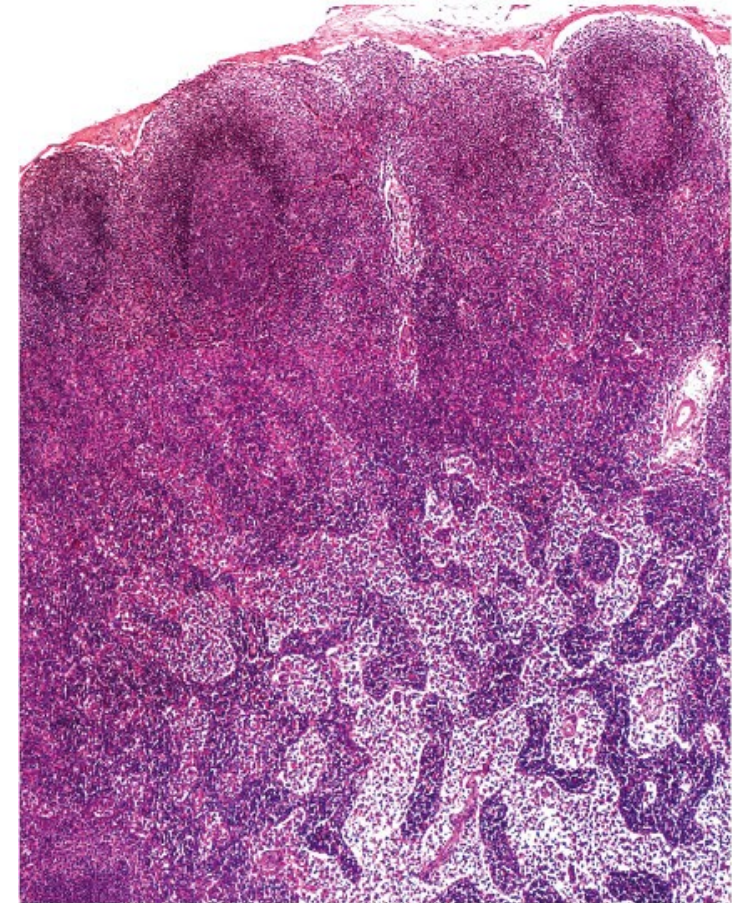
**2- High endothelial post
capillary venules**

B lymphocytes
cortex

outer

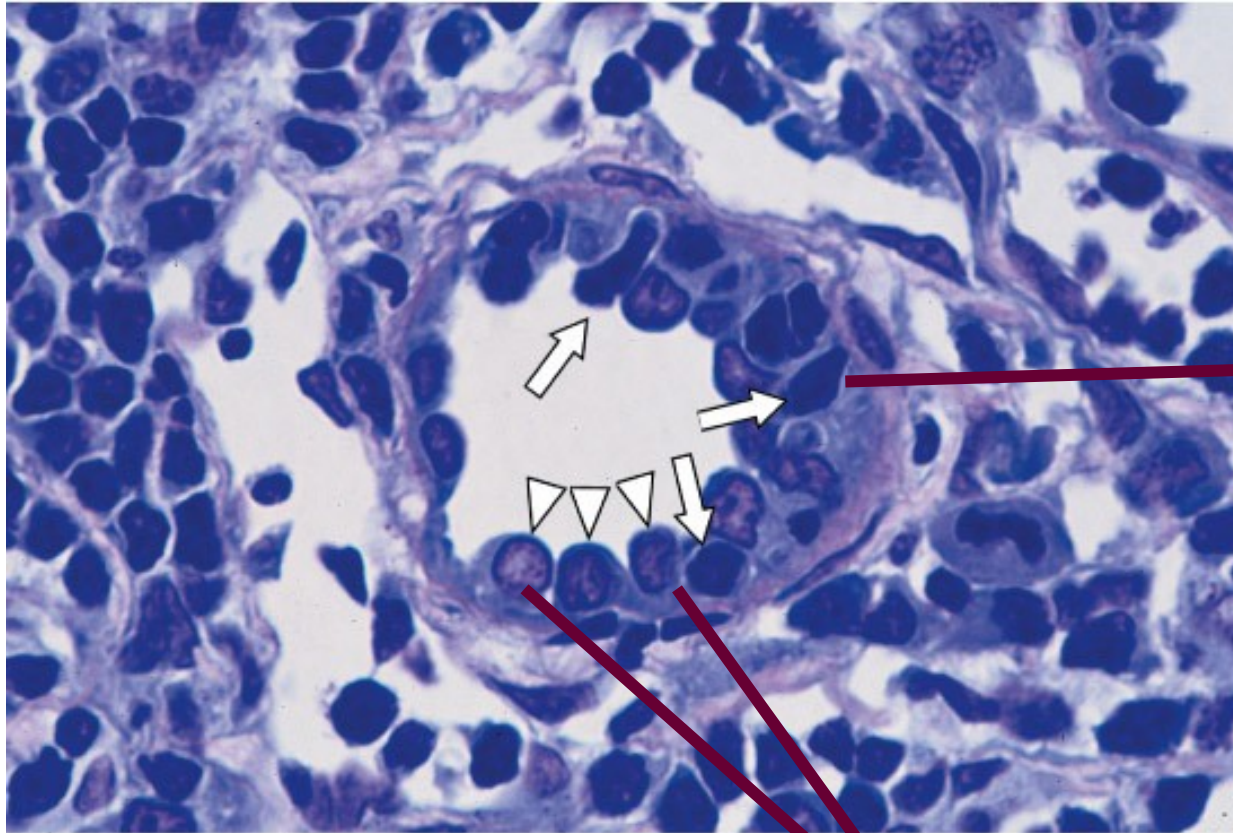
T lymphocytes
cortex

para



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Lymph node-Paracortex



lymphocytes

High endothelial cells

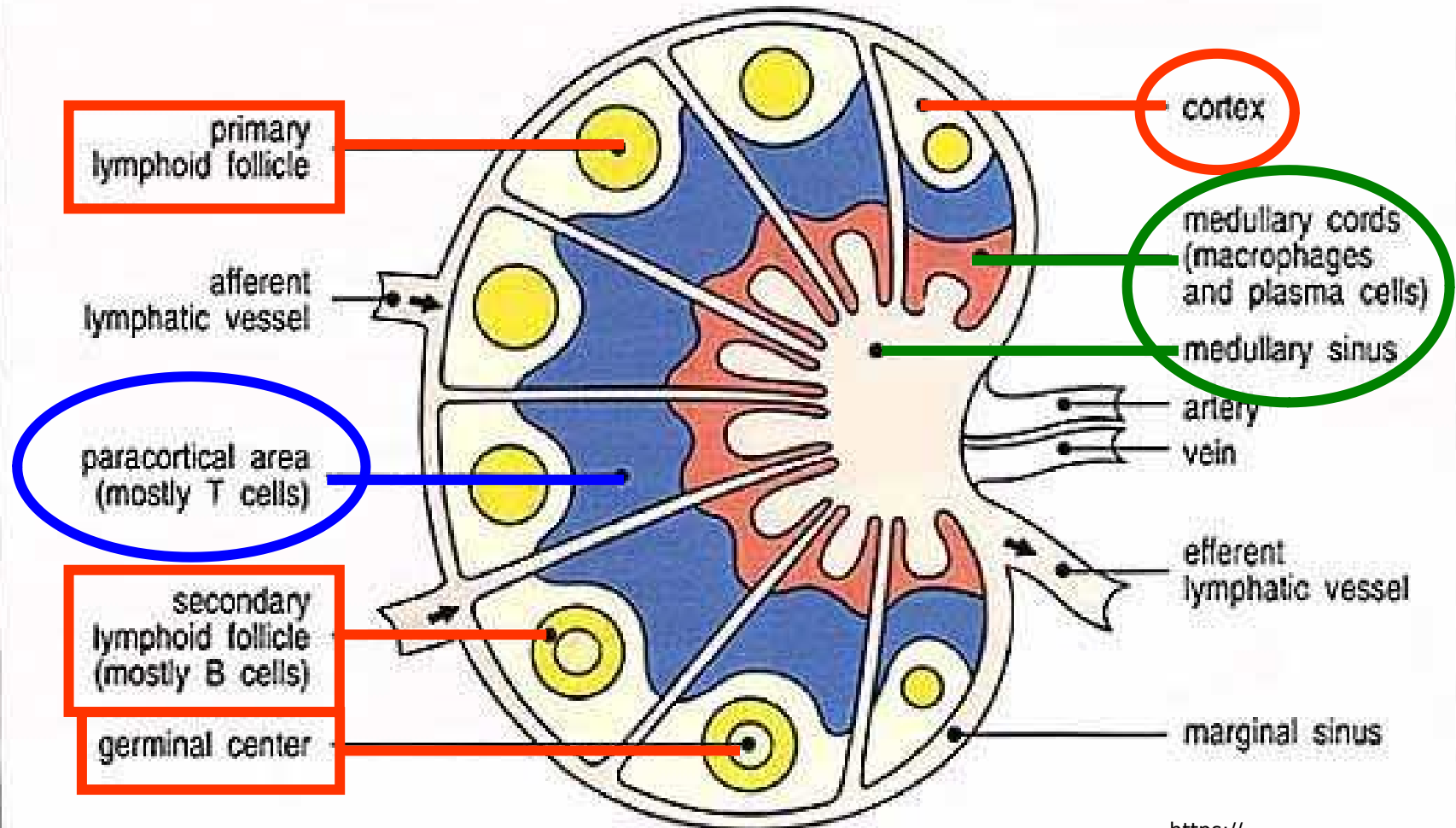
High endothelial post capillary venules where lymphocytes leave blood and enter the lymph node between the high endothelial cells

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Lymph node-Paracortex



The lymph node



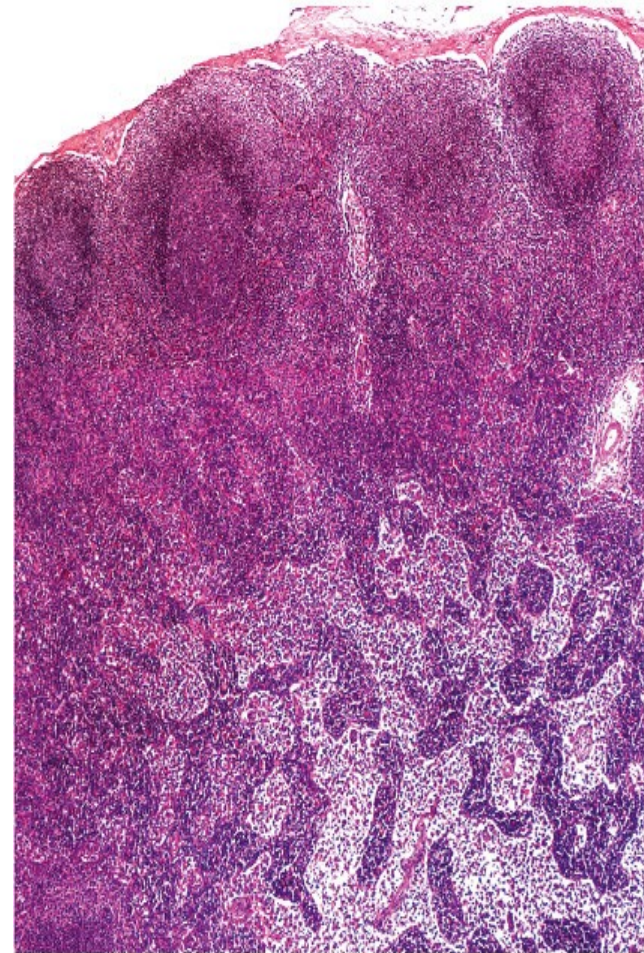
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Lymph node-Medulla

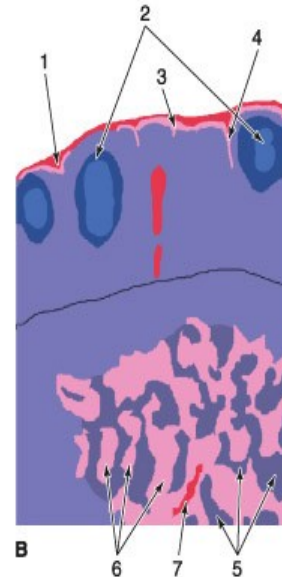


- It is surrounded by the cortex except at the region of the hilum
- It is composed of:
 - A- Medullary cords (cells)**
 - Branch and anastomose
 - Separated by medullary sinuses
 - B lymphocytes, T lymphocytes, plasma cells and macrophages.

B- Medullary sinuses



A

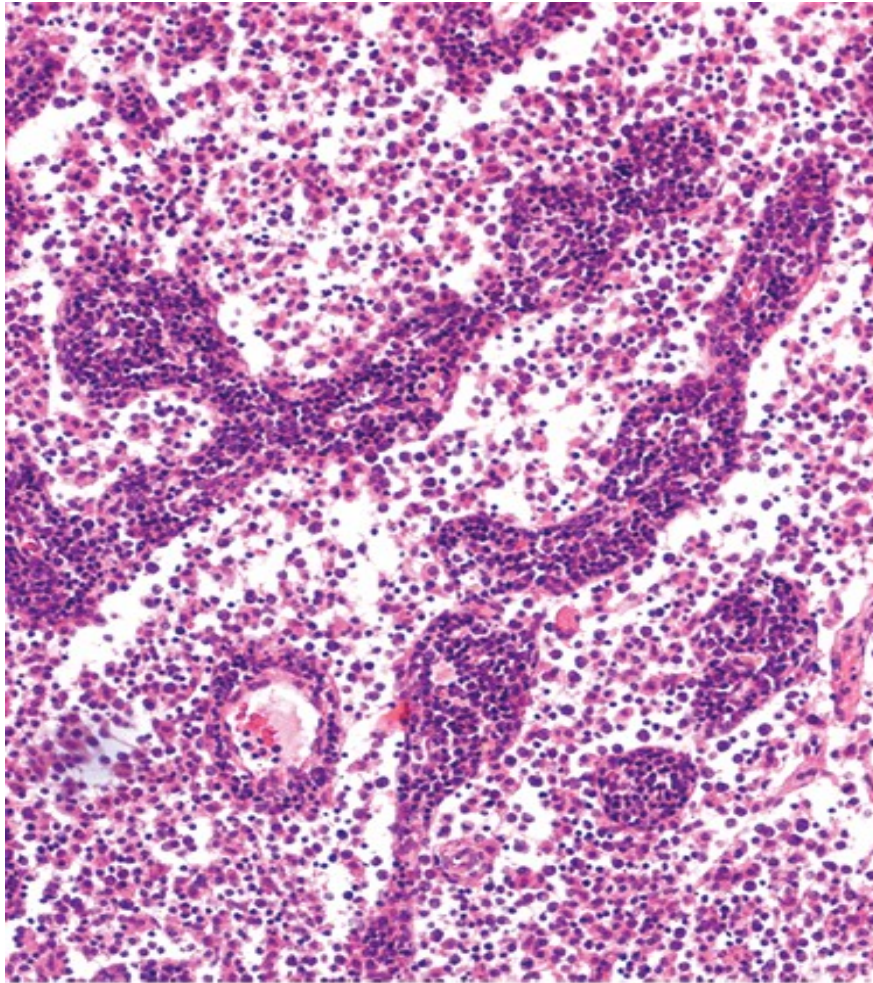


B

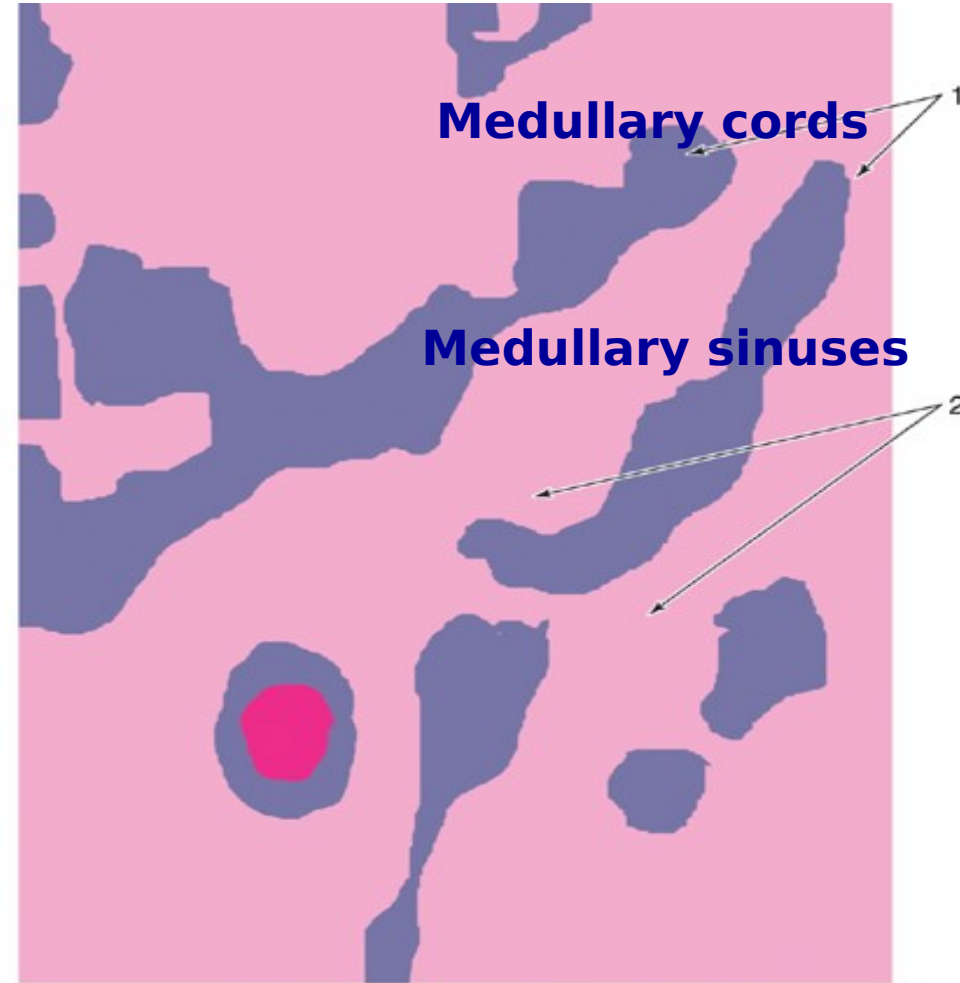
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Medulla of the Lymph node



A



B

Lymph node



Test



1. Cortex, 2. Paracortex, 3. Medulla, 4. Medullary cords, 5. Lymphatic nodules

Lymph node



Functions of the lymph node

➤ Filtration of lymph

About 99% of the antigens carried by the lymph from any organ or tissue are phagocytosed by the macrophages present in the lymph node.

➤ Humoral immune response

➤ Cell mediated immune response

➤ Maintain and produce B and T lymphocytes

Lymph node



Medical application

- **Infection** leads to enlargement of LN.
- **In cancer**, malignant cells will reach the LN then spread to distant organs (metastasis)





Question



- Lymphocytes leave the blood to enter the lymph node through

High endothelial postcapillary venules

Question



The paracortex of the lymph node :

- A- is composed mainly of T-lymphocytes
- B- is considered the thymus dependent area of lymph node
- C- has many high endothelial post-capillary venules
- D-all of the above

Question



High endothelial post-capillary venules :

A-are present in the paracortex of the lymph node

B- are the site where lymphocytes leave the blood to enter the lymph node

☒ C- are lined by high cubical cells

D- all of the above

Question



- High endothelial venules in the lymph node are present in:

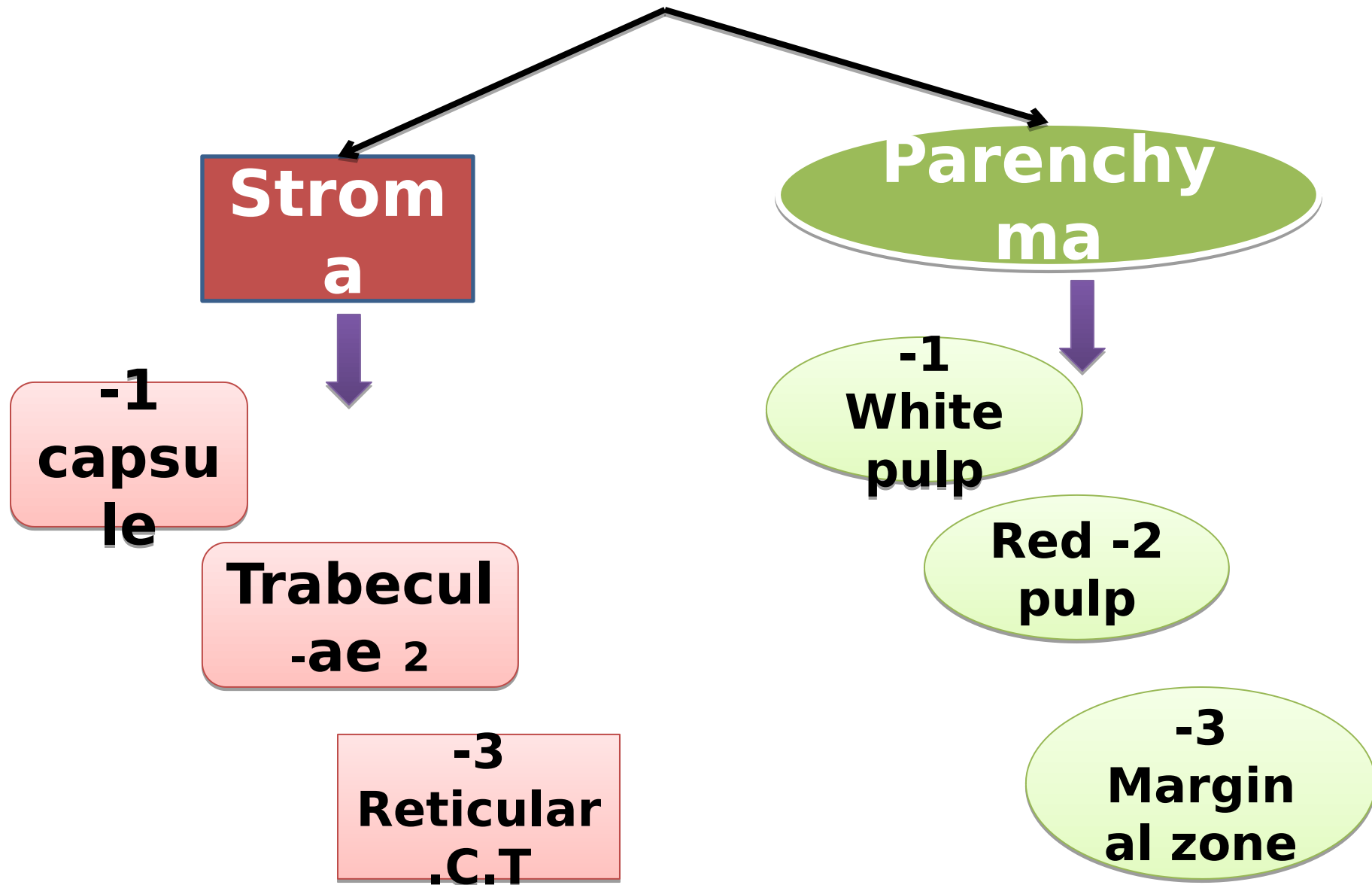
1. Outer cortex
2. Medulla
3. Deep cortex
4. Marginal zone

The Spleen



- **It is the largest lymphatic organ**
- **Differs from lymph node as:**
 - **It is Not divided into cortex and medulla**
 - **No afferent lymphatics**
 - **It filters blood (not lymph)**

The Spleen



The Spleen



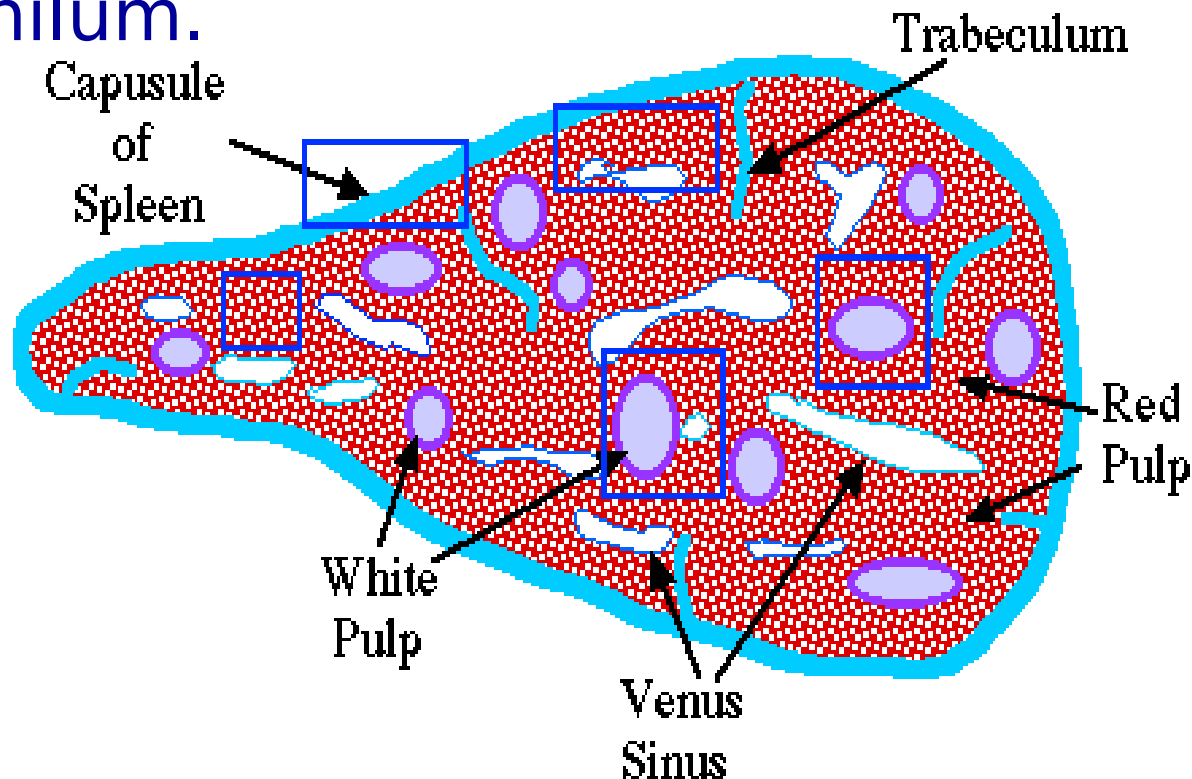
A. Stroma

1. Capsule

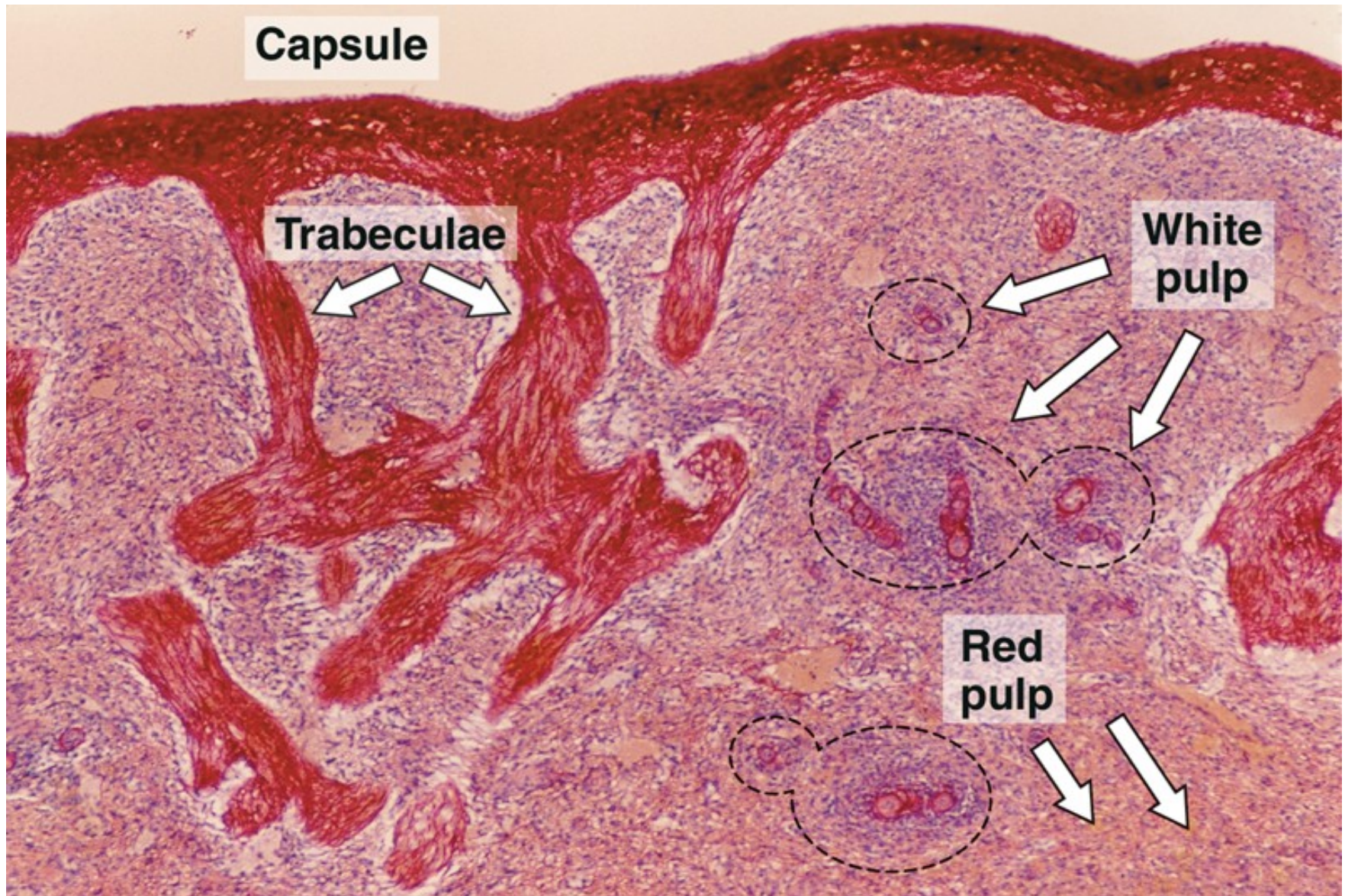
-Formed of C.T. fibers, fibroblasts, and **smooth muscle fibers**. -Covered by **peritoneum** and thickened at the hilum.

2. Trabeculae

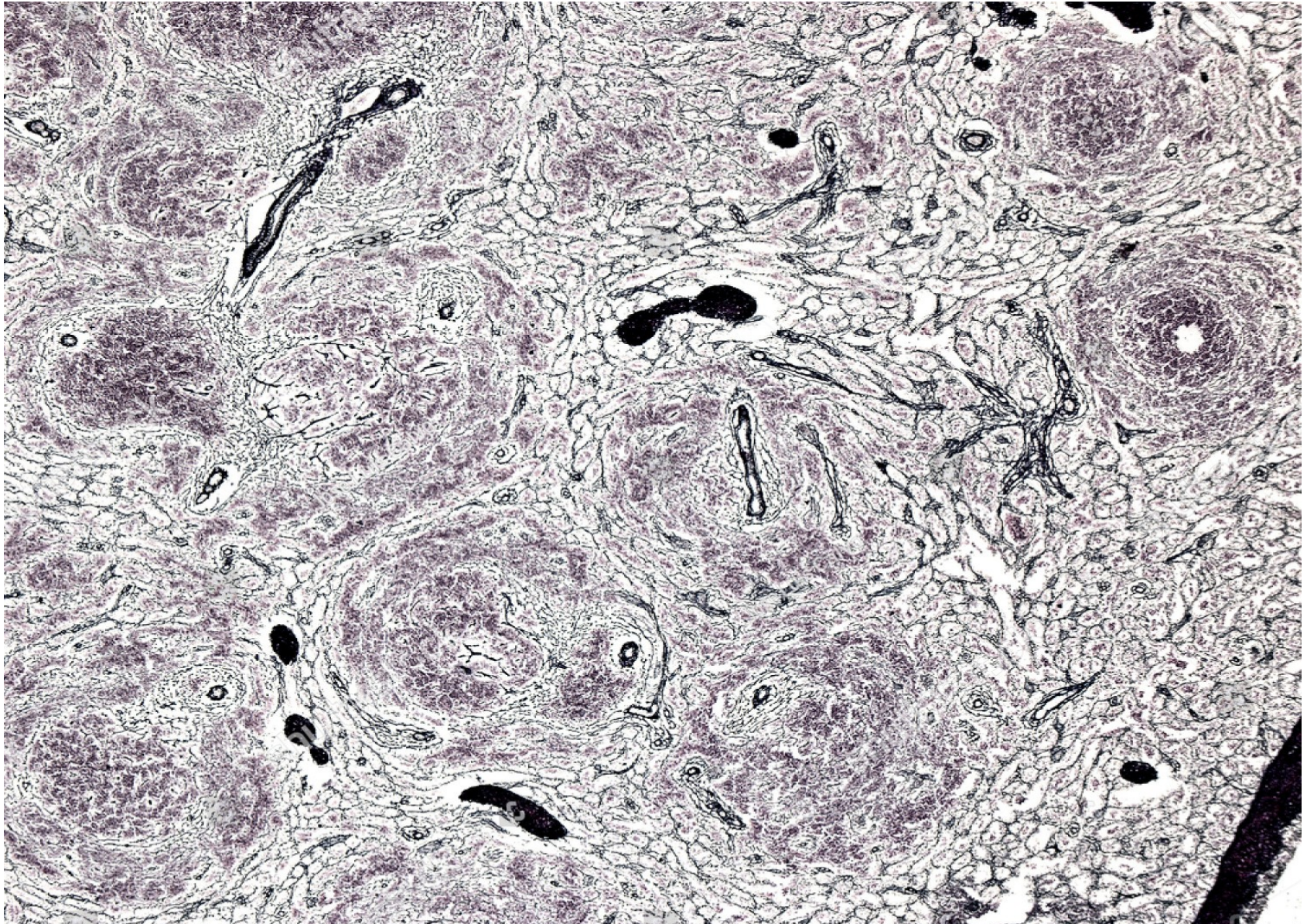
3. Reticular C.T.



The Spleen



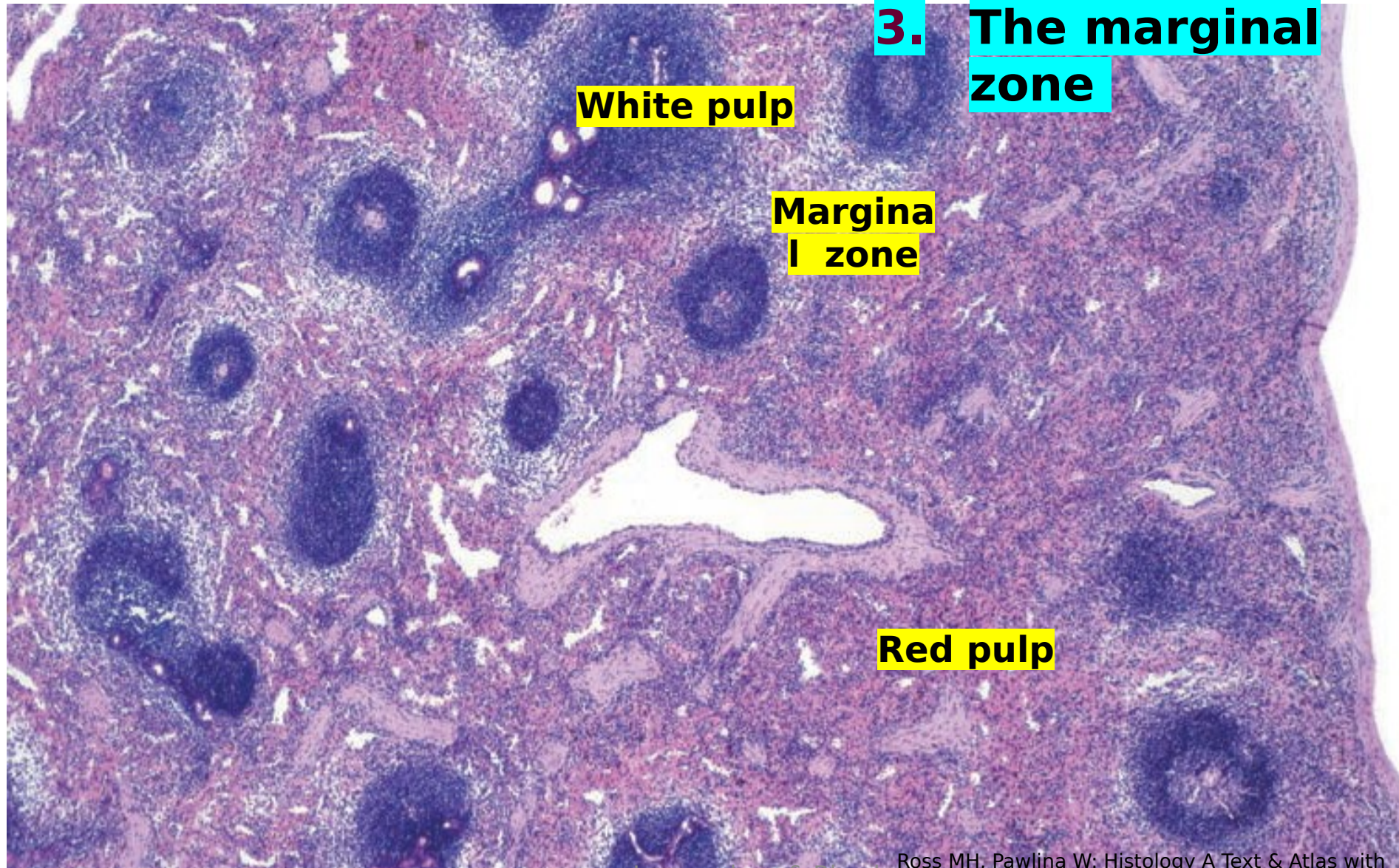
The Spleen-Reticular CT (silver)



<https://image.shutterstock.com/z/stock-photo-human-spleen-stained-with-silver-to-show-the-meshwork-of-reticular-fibers-splenic-cords-and-149425547.jpg>

The Spleen-Parenchyma

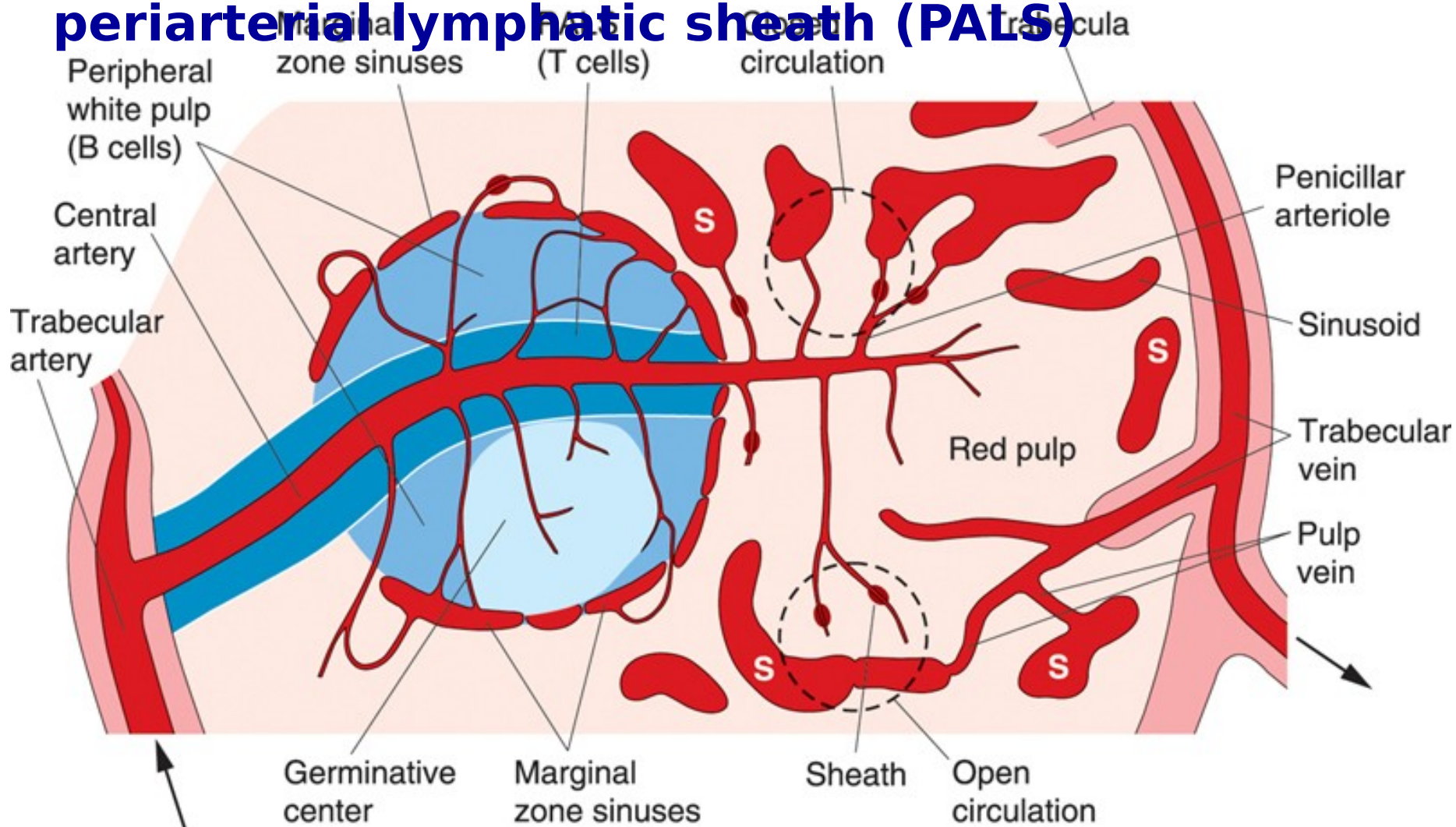
1. The white pulp
2. The red pulp
3. The marginal zone



The Spleen



- **Splenic Artery** → **trabecular arteries**
central artery which becomes covered by
periarterial lymphatic sheath (PALS)



The Spleen- 1-The white pulp



- Consists of lymph nodules traversed by central (follicular) arteries. Usually they are secondary with germinal centers.

- It is formed of 2 major parts:

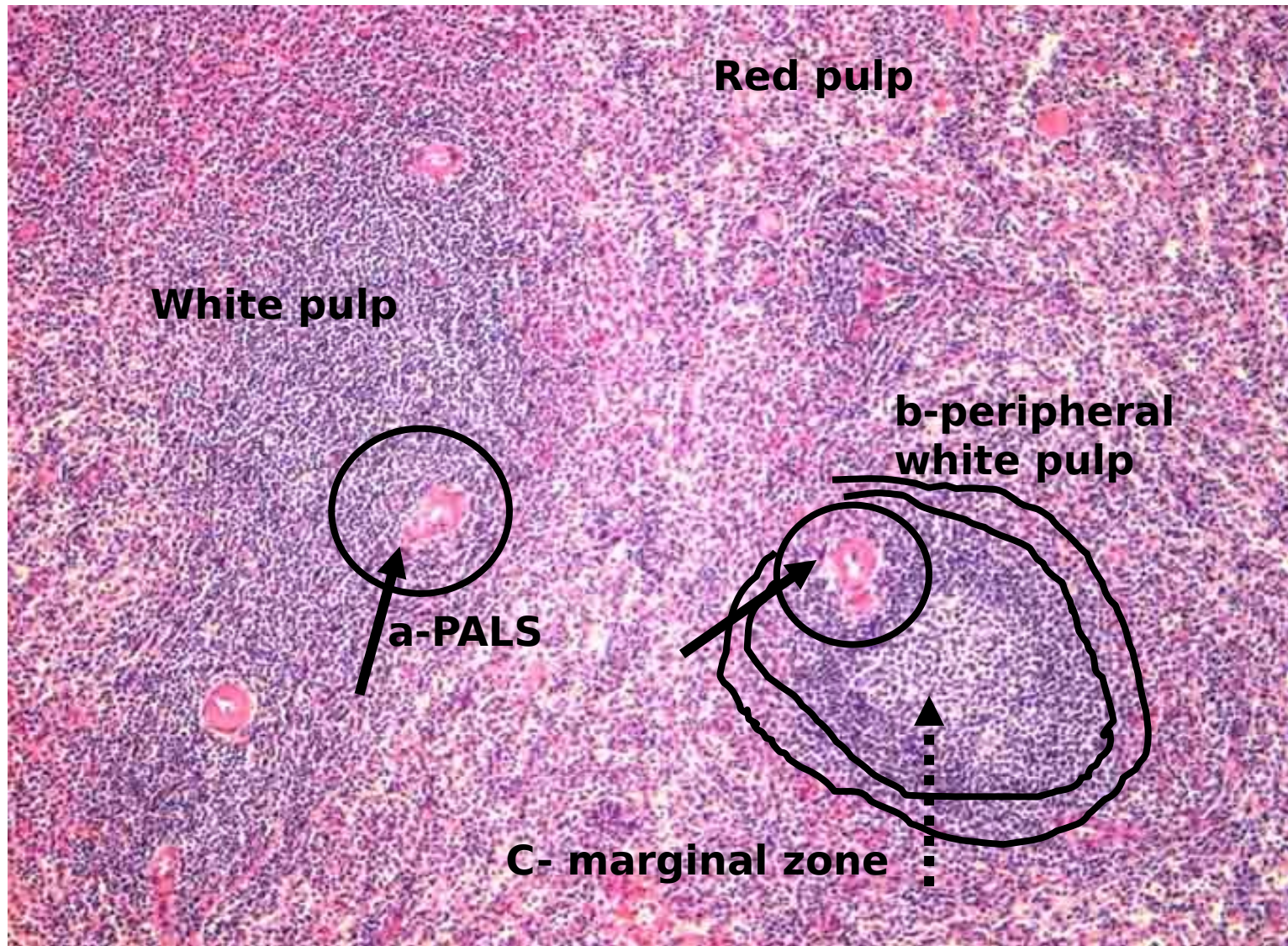
Periarterial lymphatic sheath (PALS)

Lymphoid tissue immediately surrounding the central artery and is formed of T-lymphocytes **(Thymus-dependent zone)**

Lymph nodules (Peripheral white pulp)

Lymphoid tissue surrounding the PALS, formed of B-lymphocytes, macrophages and Ag presenting cells, may have germinal centers

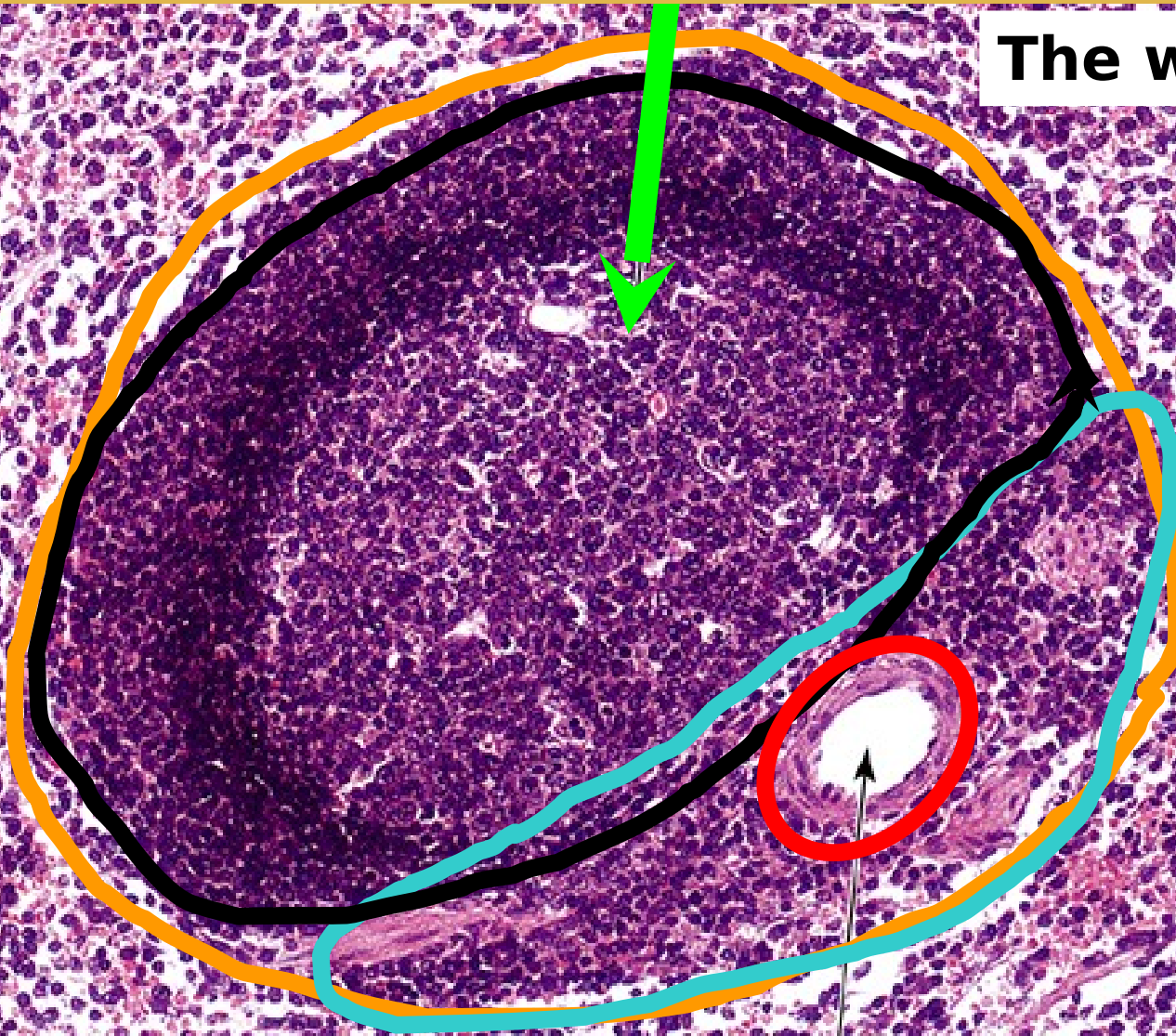
The Spleen



The Spleen



The white pulp

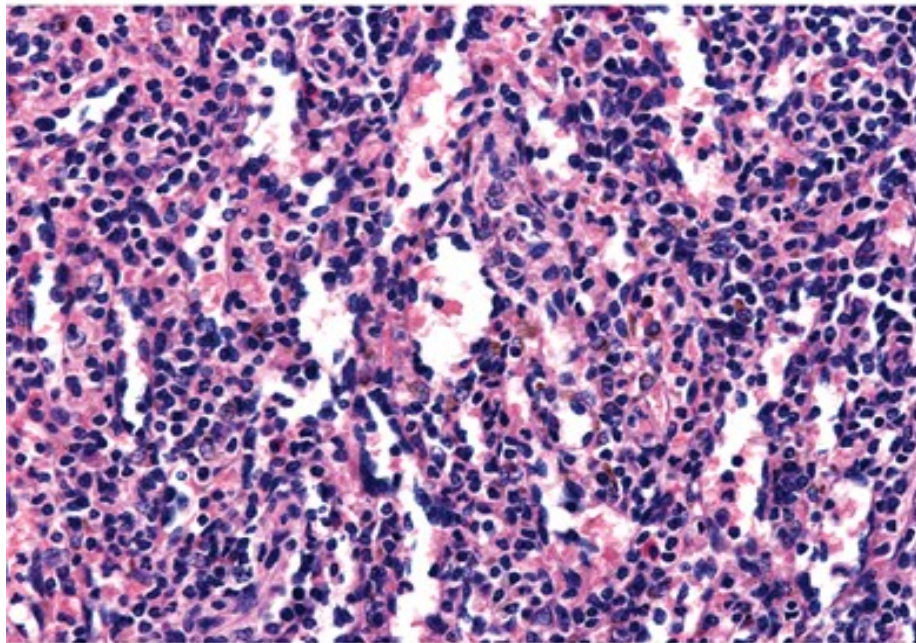


The Spleen

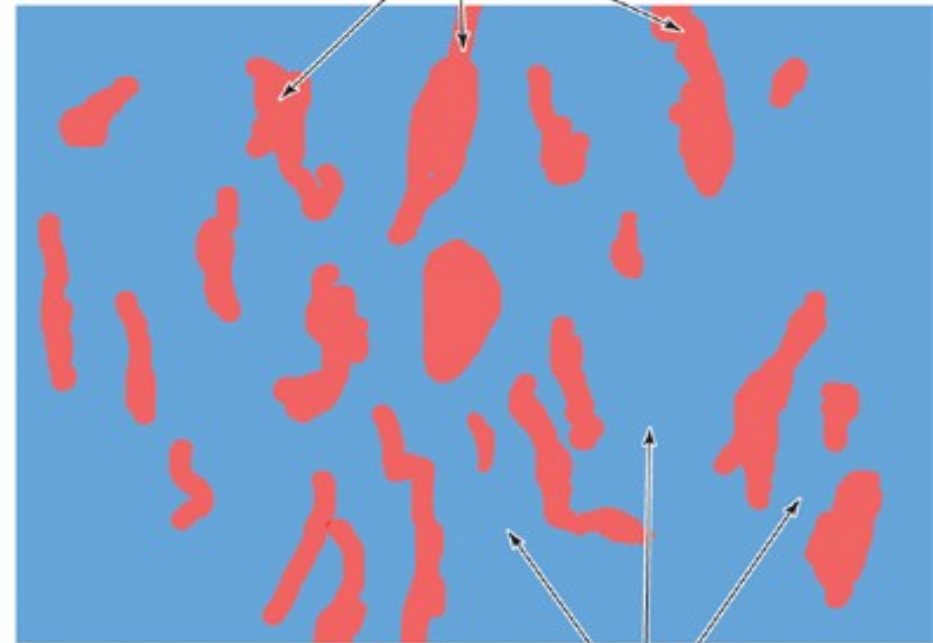


2-The red pulp: Splenic sinusoids Splenic cords

Splenic sinusoids



A



B

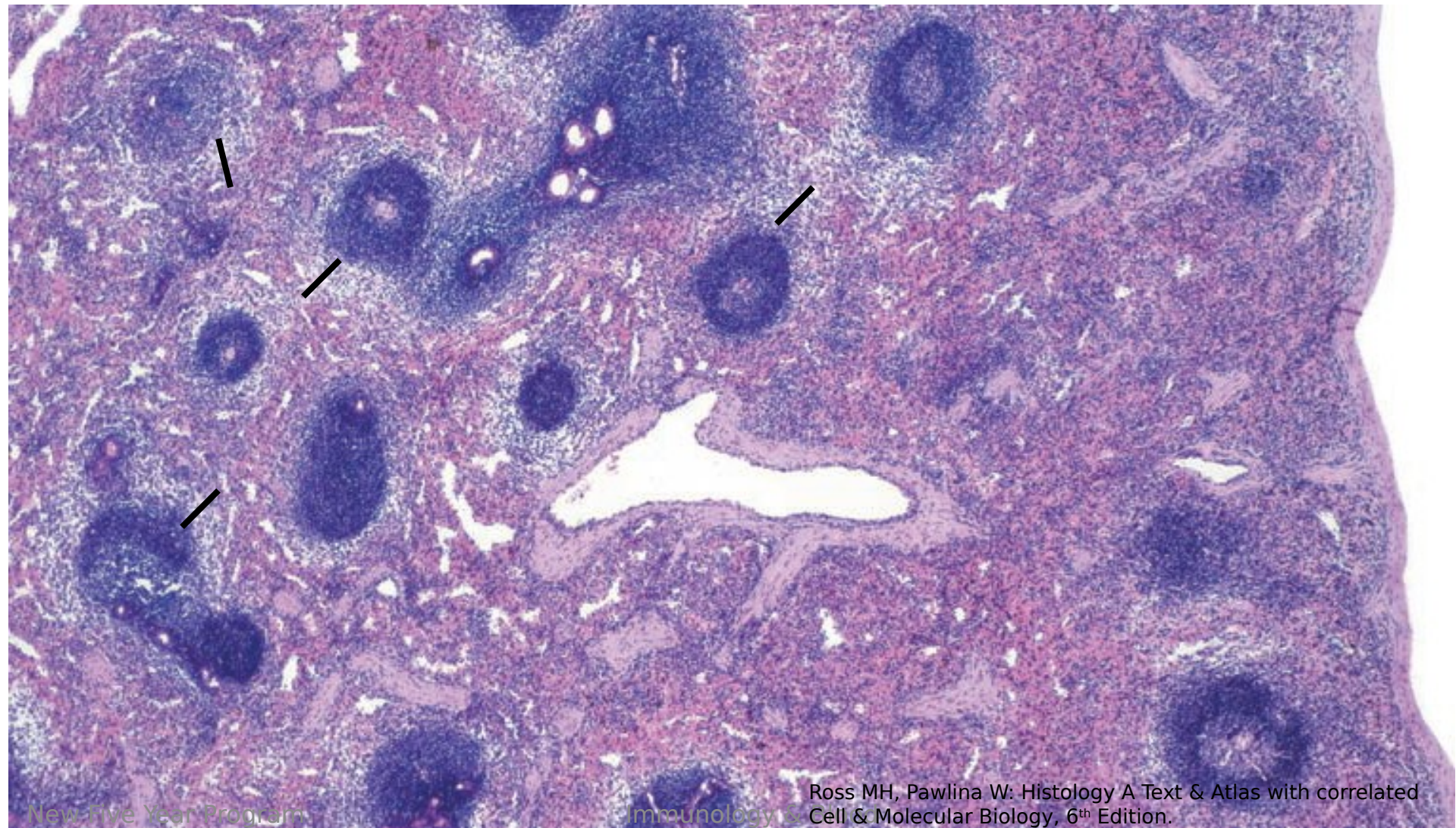
Splenic cords

<https://lh3.googleusercontent.com/CAgejMn3btYIVoKAH8CyBqh0oTl6CkjPYTat0BuHE3trDoqnO8NUvg5csm70ozU-qml=s170>

The Spleen



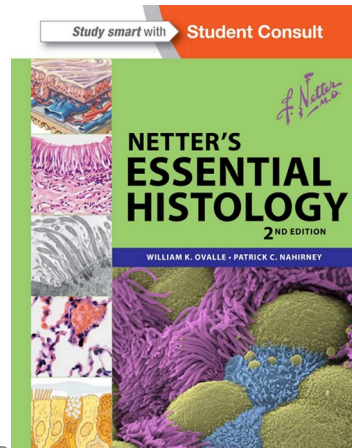
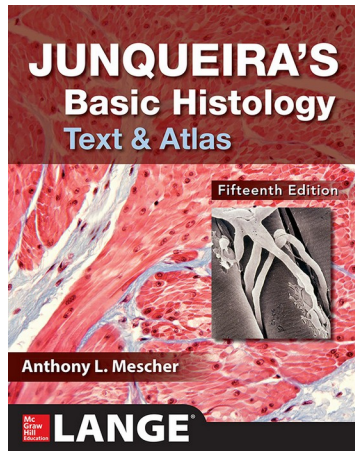
The marginal zone-3



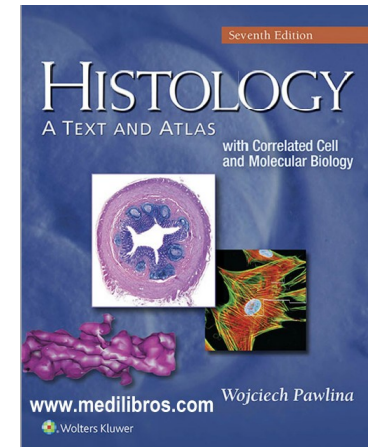
SUGGESTED TEXTBOOKS



1. **Junqueira's Basic Histology: Text and Atlas, 16th Edition by Anthony Mescher, 2018.**
2. **Michael H. Ross & Wojciech Pawlina (2024), Histology Text and Atlas with correlated cell and Molecular Biology, 7th Edition.**



Endocrine & Genitourinary Module





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